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Butler, M.

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By Monika Bütler

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Monika Bütler*
DEEP Université de Lausanne, CentER Tilburg University & CEPR

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Address: Monika Bütler, DEEP–HEC, Université de Lausanne, BFSH1, CH–1015 Lausanne, Switzerland; email *Monika.Butler@HEC.unil.ch*, tel + 41 21 692 3451, fax + 41 21 692 3365.

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Abstract

In 1998, the Swiss voters approved of an increase in female retirement age from 62 to 64. The referendum, being on a single issue only, offers a unique opportunity to explore the political feasibility of pension reforms and to apply theoretical models of life–cycle decision making. Estimates carried out with municipality data suggest that the outcome of the vote conforms relatively well with predictions drawn from a theoretical simulation study. There are, however, surprising gender differences even in married couples. Young agents, married middle–aged and all elderly men favor an increase in female retirement age, while middle–aged and elderly women strongly oppose it. Richer communities and those with a high proportion of self–employed or a low fraction of blue–collar workers are more likely to opt for a higher retirement age. Ideological preferences and regional differences also play a considerable role.

Jel–Classification: H55, D91, D72, J18

Keywords: Social Security Reforms, (Female) Retirement Age, Life–Cycle Decision Making

1 Introduction

The task of eliminating fiscal imbalances of unfunded public pension systems is one of the most urgent policy concerns in industrialized countries. Although the problem is widely recognized, policy makers are reluctant to implement painful reforms to the current systems. The reason is obvious: most living agents, and in particular those at voting ages, will lose from cuts in their pension entitlements. From an illuminating questionnaire study involving several thousand citizens in four major European countries (France, Germany, Italy, and Spain), Boeri, Börsch–Supan & Tabellini (2001) conclude that *"a majority of the citizens does not want to change the status quo size of pension benefits, even in the light of high current taxes and contributions"*.

One important reform option — an increase in retirement age — has been ignored by almost all theoretical contributions in the area.[1] This omission is even more surprising in view of the fact that mortality rates have decreased dramatically in the last decades, and a delayed entry into the labor market due to longer education periods has decreased the average contribution period. Unlike a uniform reduction in the pension level, a financially equivalent increase in retirement age should find some support among the retirees: At least those beyond the targeted statutory retirement age should not oppose such a reform.

While theoretical studies on the political economy of pension reforms are abundant, empirical evidence is very scarce.[2] This is not surprising: The direct democracy paradigm used by most theoretical contributions is largely unrealistic for most countries, and in the few instances where there is a direct democracy decision, it is often very difficult to disentangle the different determinants of voting behavior.

This paper analyzes the outcome of a recent popular initiative[3] concerning

[1] The public choice literature on pay–as–you–go (PAYG) public pension systems, as pioneered by Aaron (1966) and Browning (1975), and summarized and extended in Persson & Tabellini (2000), Breyer (1997) and Verbon (1990), has traditionally focused on a narrow parametric contribution–benefit trade–off, mostly neglecting retirement age as a possible parameter. In (Bütler (2000)) it is shown that, under certain circumstances, an increase in retirement age might politically be more feasible than an increase in pension contributions (taxes), especially if additional distortions, such as progressive income taxes, are taken into account.

[2] I am aware of two papers that attempt to explain the level and development of social security with empirical observations. The first study by Congleton & Shughart (1990) tries to test the relevance of the median–voter model vis–a–vis the interest group model for US social security and find considerable support for the former. From a panel of OECD countries, Breyer & Craig (1997) conclude that larger programs are associated with a higher median voter age, more income heterogeneity, and a greater similarity in family size.

[3] Swiss citizens may seek a decision on an amendment they want to make to the constitution. For such an initiative to be organized, the signatures of 100'000 voters (approximately two percent of the voting population) must be collected within 18 months. While retirement is not a particularly appropriate subject for a constitutional amendment, such additions are common in Switzerland as popular initiatives are constraint to changes to the constitution, but not to

female retirement age in Switzerland. The initiative's aim was to prevent female retirement age to be increased from 62 to 64, as had been decided — as part of a large social security reform package — in a plebiscite three years before. A 60% majority of voters decided against the initiative, i.e., in favor of a higher female retirement age. As can be seen in Figure 1, however, there were large regional differences:[4] A majority of voters in French and Italian speaking cantons decided in favor of a lower female retirement age as proposed by the initiative.

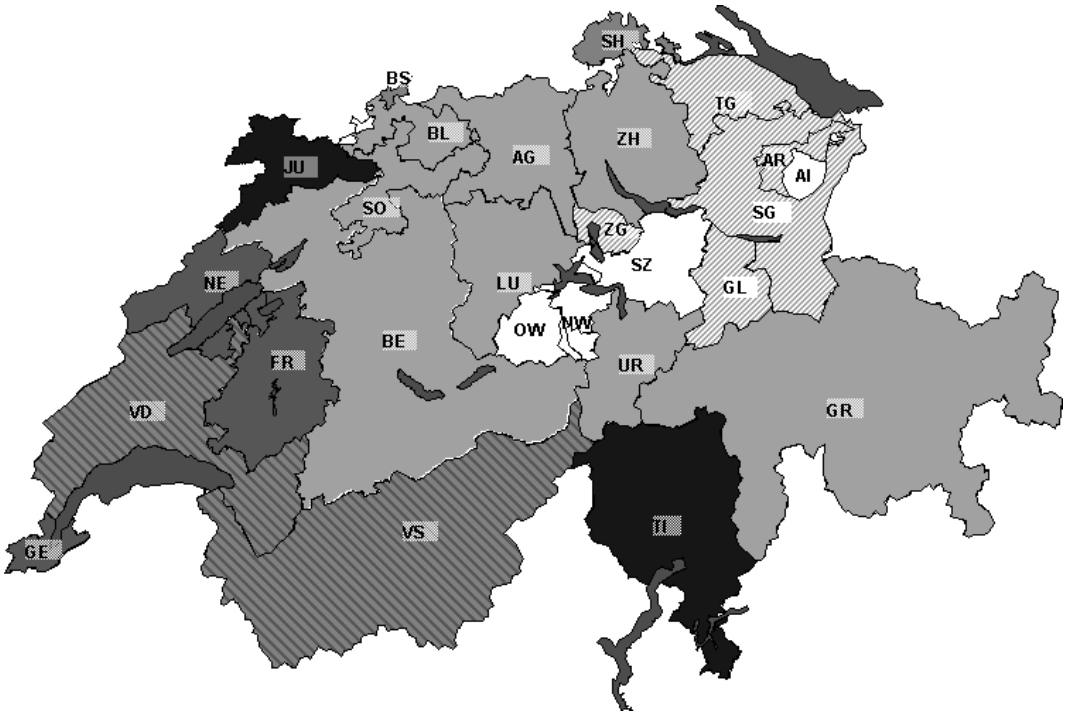

Figure 1: *Outcomes of the popular initiative "No increase in female retirement age" in 26 Swiss cantons. Different shades of Grey correspond, in ascending order, to the percentage of YES votes: < 30% (= white), 30–35%, 35–40%, 40–45%, 45–50% (dark diagonal pattern), 50–60% (dark Grey), and > 60% (black).*

Although referenda on public policy issues are common in Switzerland, the referendum stands out as a unique opportunity to explore the political economy

the law.

[4]The 26 cantons are the Swiss states, which enjoy a substantial autonomy in a number of important fields such as education, tax structure, and public services. There is a large heterogeneity between and within cantons, in terms of size (from roughly 30'000 to more than a million inhabitants), institutions, income distribution, and other socioeconomic characteristics. French is spoken by a majority of citizens in the cantons of Geneva (=GE), Vaud (VD), Neuchâtel (NE), Fribourg (FR), Valais (VS), and Jura (JU). The Ticino (TI) is Italian speaking, while Swiss German is the main language in all other cantons.

of pension reforms. Unlike most other votes on social security issues, the ballot was on one dimension only and was not part of a larger package deal. The proposal — which is explained in more details is section 2 — is clear, and it is relatively easy to figure out how much different groups in the population benefit or lose from such a reform. Since a low female retirement favors middle–aged and elderly women at the expense of men and — given the unfavorable demographics — even young women, one would expect men, very young and elderly women (beyond the targeted retirement age) to favor the increase.[5] Pension benefits are practically the same for every retiree, whereas contributions are approximately proportional to income. Consequently, the rich should favor an increase and voters with a low income, high income uncertainty or high risk aversion should oppose it. However, decision making is more complicated than that: Voters should also take into account marital status and its expected evolution (divorce, widowhood), and even future policy decisions.

To explore individual choices and voting decisions over the given pension reform options, a theoretical life–cycle model is presented in section 3. Agents' choices as a function of age and income, but also conditional on gender and current marital status are discussed. The latter is important for understanding the decisions of male voters: An increase in female retirement age might reduce a married couple's future consumption possibilities, and therefore induce the husband to oppose the reform just as much as his wife does.

Data and the used empirical strategy are discussed in section 4. Although detailed data on approximately 2800 Swiss municipalities is available, the information suffers from aggregation problems. For example, it is possible that the demographic life–cycle variables of interest are masked by other socioeconomic variables, in particular income. To illustrate the importance of aggregation and to discuss the chosen estimation strategy, an artificial aggregate economy is simulated, based on household choices, as well as within and between municipality income variability. The results from this exercise show that estimation results have to be interpreted with care: Although all agents in the artificial economy decide rationally, life–cycle effects can be dominated — though not completely masked — by income effects.

The empirical results are presented in section 5. Approving vote shares of the initiative are estimated with a grouped logit model on a municipality level. A number of socio–economic variables and the demographic distribution by age $\times$ gender $\times$ marital status is used. Despite some data limitations, one finds support for the predictions of the theoretical model: Young men (and young women in

[5]Note that for a working agent with an average mortality rate, a decrease in the benefit level (leaving retirement age unchanged) or a compensating increase in the legal retirement age (leaving the benefit level unchanged) is basically equivalent. For him, the two options only differ in insurance aspects (which in turn depend on the availability of annuities). As soon as an agent has reached the statutory retirement age, he is better off with an increase in retirement age than with a decrease in the benefit level.

German speaking regions) favor an increase in female retirement age. In contrast to middle–aged and elderly men who favor such a reform, female middle–aged and elderly voters strongly oppose a higher retirement age. The opposition of elderly female voters is surprising as they are not affected by the change. With an R^2 exceeding 0.8 in most estimates, the outcome of the referendum can be well explained by a combination of socio–economic variables and demographic factors. As in the simulated artificial economy, community income is the dominating economic variable in explaining the variation in vote shares. Nevertheless, other socio–economic characteristics and ideologies are also important. Communities with an above average fraction of left–wing voters strongly oppose delaying retirement benefits. A striking feature in all estimates is the importance of language.

The conclusions in section 6 summarize the findings and try to draw some conclusions for the *the political feasibility of a* general *increase in retirement age.*

2 The Swiss Social Security System and the Ballot on Female Retirement Age

The Swiss social security system is composed of two pillars of approximately equal importance. The first pillar AHV/AVS,[6] a predominantly pay–as–you–go (PAYG) system, was introduced after a very successful referendum in 1948. During the last 50 years, its structure has changed considerably in 10 so–called revisions. Two of them — the minor 9th revision in 1978, and the substantial structural 10th revision in 1995 (see below) — were unsuccessfully challenged by a referendum. Since a large increase in the size of the program in the late 60's and early 70's (both payroll tax and pension benefits approximately doubled), the payroll tax rate has remained unchanged, and ratio between average pension benefits and average per capita wages has remained almost constant. The first pillar is complemented by a mandatory, employer–based, fully funded pension scheme of almost equal size, which is targeted at maintaining the previous providing retirement income beyond the basic level covered by the PAYG system. Although the second pillar is not without controversy, most pension funds are financially healthy and contributions are generally viewed as a forced savings device. Public attention clearly focuses on the financial problems of the PAYG system.

The main features of the first pillar can be described as follows: Although there is a small trust fund, the public pension system is a pay–as–you–go system, in which the current young have to finance the pensions of the current old. The system is financed mainly with a proportional payroll tax, and an ear–marked

[6] AHV = Alters– und Hinterbliebenen–Versicherung; AVS = Assurance Vieillesse et Survivants.

fraction of the consumption tax (value added tax). 20% of total expenditures are financed out of general federal government revenues. Pension benefits are paid out after the legal retirement age J^*, regardless of whether the agent leaves the workforce or not. There is a limited tax–benefit linkage in Switzerland, but the benefit scheme is relatively flat in reality. A majority of retirees qualify for the maximum benefit level. More important for the determination of future benefits is the number of contribution years including those granted for child care.[7] As in most other countries, the system offers some redistribution within and between generations and insurance against various contingencies.

The 10th AHV/AVS reform, approved by the Swiss voters in 1995, led to a number of important structural changes although the contribution rate and total expenditures remained basically unchanged. First, family/household benefits have been replaced by individual benefits. Second, individuals with responsibilities for children up to 16 years or other dependants are entitled to (child–)care credits. Third, contributions during marriage, including child–care credits, are split between the spouses. This change led to a substantial improvement for divorced women, but reduced the entitlements of couples with a non–working spouse and few or no children. As a fourth and most disputed change, the legal retirement age for women was to be raised by two years, from 62 to 64 years.

2.1 The Ballot on Female Retirement Age

After the ballot on the 10th revision, a number of (mainly union and social–democratic) groups started a popular initiative for a "10th revision without an increase in female retirement age". The ballot was held on September 27, 1998, and was unsuccessful. The initiative got approximately 40% of the votes. As already pointed out and obvious from Figure 1, however, the approving vote shares differed widely across cantons and, as shown in the summary statistics of Table 5, across municipalities.

One important objection to investigating this particular vote is the negative phrasing of the initiative, i.e., "YES" means "*no* increase in female retirement age". Two observations mitigate this point: First, exit polls after the ballot have shown that a large majority voters did indeed understand the question. Second, Swiss voters are used to negative phrasing of referenda. A sizeable fraction of federal, cantonal and municipality ballots (approximately 20–40 per year) have a similar, if not more complicated wording.

A second difficulty for the analysis is that the financing of a lower retirement age for women was not specified in the popular initiative. As a consequence

[7] The linkage between pre-retirement earnings and the benefit level has become considerably weaker in the last two decades. A large majority of (potential) beneficiaries with a full contribution period are entitled to maximum benefits, so that earnings history only matters for people with low average wages and/or contribution gaps. In 1998, for example, an average married couple received more than 92% of maximum benefits.

the two options are financially not equivalent, which potentially complicates the analysis. In the last few years however, a consensus has emerged in Switzerland, that financial imbalances should not be financed out of an increase in payroll taxes, but should be covered by an earmarked increase in the value added tax. While the focus of the analysis will be on an offsetting increase in the consumption tax rate, theoretical results for a respective increase in the payroll tax rate will also be presented. The two options voters face are therefore:

YES = No increase in female retirement age, financed by a higher tax rate.

NO = Increasing female retirement age by two years, leaving tax rates unchanged.

A third difficulty is that even if the demographic and economic structure (including their forecasts) were publicly known, computing the degree of an offsetting adjustment in the VAT rate or in the payroll tax rate is a difficult task, and it is not obvious that people can correctly assess the costs implied in keeping female retirement age low. Fortunately, the media presented a rough estimate of the costs, amounting to a one percent increase in the consumption tax or a one percent increase in the payroll tax. These estimates come close to the rates determined by an intertemporally balanced budget rule, outlined in Appendix B.

3 Theory

Voting decisions are individual — or at most household — decisions. The first part of this section presents a stylized life–cycle model and discusses individual voting behavior as a function of age, income, gender, and marital status.

Unfortunately, there are no individual data on voting behavior. As with any aggregation the grouping of heterogeneous agents in municipalities will result in a loss of information. To get an impression of the impact of aggregation a simulated economy composed of fully rational life–cycle agents is constructed in a second step. This setting also allows me to present the techniques used, and to foreshadow the problems to be encountered in analyzing the real data.

3.1 Individual Decision Making

An individual lives a maximum of $J^{\max}$ periods, facing a certain mortality risk in every period of her life.[8] In view of a given age–wage profile she adjusts her labor supply and consumption to maximize her life–time utility, defined over consumption c and leisure l. Optimal decisions should depend on the marital status, its expected evolution, and the income of the spouse. While a formal

[8] A detailed description of the model used for the analysis and the numerical simulations of Figures 2 and 3 can be found in Appendix B.

model of joint household decision making is not presented here, its implications on the empirical predictions of the theoretical model are discussed below.

Let us assume that at the time of the vote, the agent has reached a certain age J^V and a level of asset holdings a_{JV}. She now compares the two options in terms of remaining (optimal) life–time consumption and leisure, and opts for the one granting her the higher implied level of utility.

The easiest way to illustrate preferences as a function of age and income is to draw the difference in utility at each age, measured by a consumption equivalent variation. This measure translates the difference in utility between the two options into a percentage difference in the possible consumption level in every remaining period of a voters life. This strategy is used in Figures 2 and 3. In principle, the difference in utility also depends on the level of asset holdings and the expected future income stream at the time of the vote. Savings in turn depends on the policy the agent has expected prior to the vote. As shown in Bütler (2000), however, the asset effect is only of secondary importance when comparing these types of policy options. The asset profile used for the graphs corresponds to a profile consistent with a rationally anticipated increase in female retirement age.

Positive values in Figures 2 and 3 correspond to a preference for the option "YES = low retirement age, higher taxes". For example, a 50–year–old single woman earning 60% of an average income will be able to consume 2.6% more in every remaining period of her life if the retirement stays at 62. The median voter model suggests that only the utility ranking of the two options matters in evaluating the two alternatives (YES and NO). In reality, however, the utility differences between two options are small for some individuals, as is apparent in Figures 2 and 3. In such circumstances, other factors such as ideological preferences might be more important.

3.1.1 Age and Income Matter ...

Should the retirement age remain unchanged, all *agents beyond statutory retirement age* will incur a consumption loss equal to the necessary increase in the consumption tax to finance the low female retirement age. They should, therefore, oppose the popular initiative. Note that for *single male voters* with no intention to marry later, an increase in female retirement age is always preferable to a tax increase by an amount corresponding to the magnitude of the adjusting tax rise. *Young voters* who still face a long contribution period ahead of them are usually better off with an increase in female retirement age, as tax distortions and especially unfavorable demographics lead to a low implicit rate of return of the PAYG system. Municipalities with a large fraction of young people should therefore oppose the initiative to a larger extent.

Because the benefit structure in Switzerland is almost flat, but contributions are roughly proportional to income, downsizing the program benefits richer in-

dividuals. As is obvious from Figure 2, municipalities with a large fraction of *high income individuals/households* are more likely to prefer a higher female retirement age, i.e., to oppose the initiative. The impact of income inequality is theoretically ambiguous: The relevant statistics for the ballot would be the fraction of voters just below the income level that makes them indifferent between the two alternatives. A more unequal distribution of income can increase or decrease this number.

3.1.2 ... so do Gender and Marital Status

Do voters take into account their (future) spouse's utility or do they only consider their own private utility? In the former case, the expected marital status is the more important determinant than the current one, especially for young agents. As most people will still marry at one point in time, voting behavior of young voters should be similar, regardless of gender and marital status. For *married couples deciding as a household entity*, the utility differences between the two options are depicted in Figure 2 (upper panel) as a function of age and income. Married couples should oppose the initiative when young and when old, and oppose it during middle–age.

As people grow older the probability of single agents to marry decreases for both sexes. We would therefore expect *single middle–aged women* to support and *single middle–aged* men to oppose the initiative. The same is true for married agents who predominantly care about their own private utility. Married couples face a considerable probability of divorce (approximately 40% of all couples). Divorcees (to be) should have similar preferences as married agents, however. Due to the newly introduced splitting rules and common practice in divorce suits, where the potential life–time income is taken into account for alimony payments, the value of the different options for *divorced agents* is similar to the one of married agents. For example, a divorced husband who is liable to support to his ex–wife financially, usually has to pay up to the legal retirement age. Any increase in the latter will increase the period of support which might induce him to support the initiative.

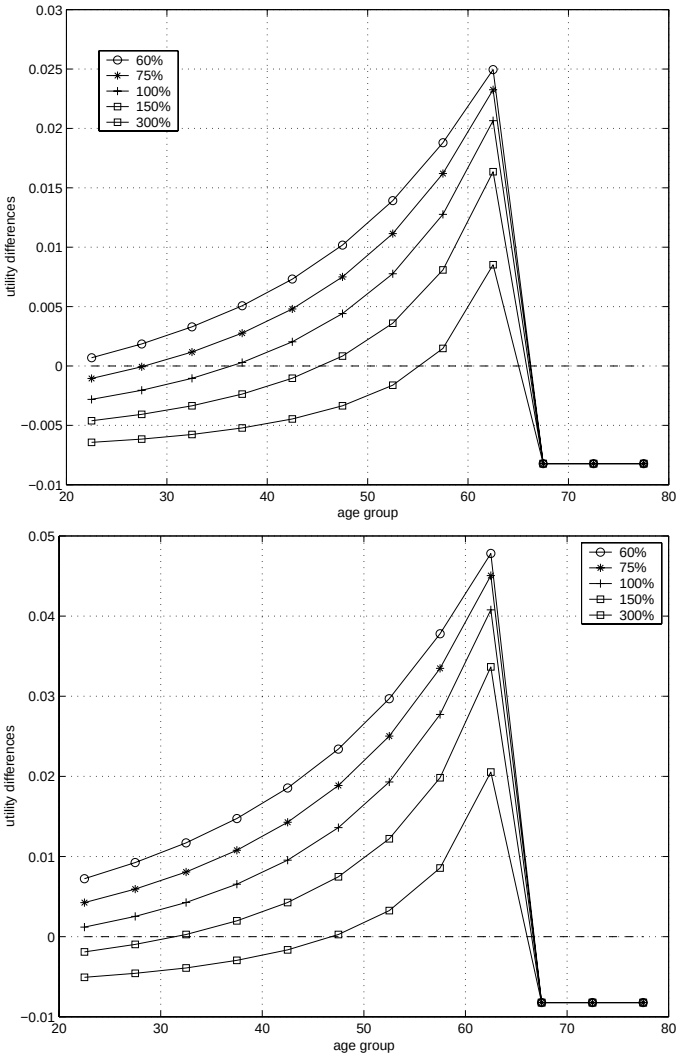

Figure 2: *Utility differences (measured as a fraction of equivalent life–time consumption) between an increase in female retirement and an increase in the consumption tax rate ν over the life–cycle for married couples (upper panel) and single females (lower panel). The profiles are drawn for different income trajectories (in % of the average income trajectory). Positive values correspond to a preference for an increase in female retirement age.*

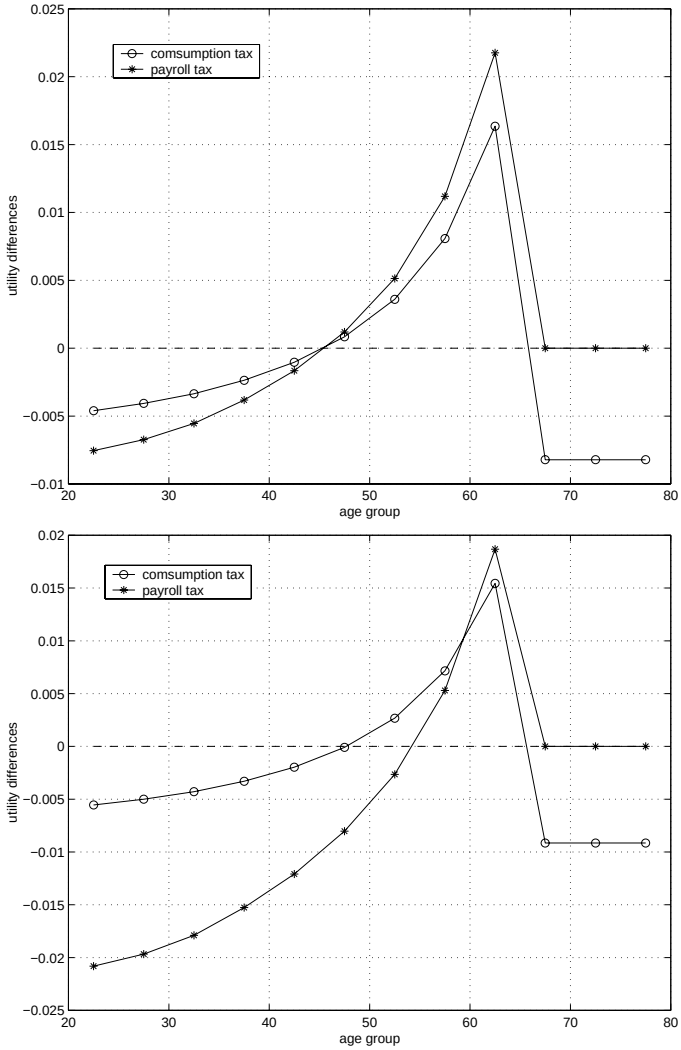

Figure 3: *Utility differences (measured as a fraction of equivalent life–time consumption) between an increase in female retirement and an increase in either the consumption tax rate or the payroll tax rate. The profiles are drawn for a married couple with a 150% average income trajectory under an optimistic (upper panel) and a pessimistic population scenario (lower panel). Positive values correspond to a preference for an increase in the corresponding tax rate.*

3.1.3 Consumption or Payroll Tax Financing?

Figure 3 illustrates the impact of two financing options under two polar population and growth scenarios: The upper panel assumes a moderately optimistic population scenario and a growth rate of 2%, the lower panel a pessimistic population scenario and zero growth.[9] Payroll tax financing is far more responsive to economic and demographic conditions than consumption tax financing. The reason is that the payroll tax is predominantly levied on (a potentially decreasing number) of younger agents, while the numerous old do not contribute. The consumption tax, on the other hand, is spread out over all agents, including the many old. In the stylized model, retirees are indifferent between the two options under payroll tax financing. In reality they would weakly prefer an increase in female retirement age, as the 20% subsidy out of general government revenues leads to a higher income tax burden for many agents.[10] For the empirical analysis, the difference between the two financing options should thus be of secondary importance.

3.1.4 What about Participation?

A potential selection bias may plague ballots with voluntary participation, as voters with a large stake in the issue are more likely to participate than voters with relatively small losses or gains.

Having said this, let me explain why I consider a potential endogeneity problem to be of secondary importance. First, it is customary in Switzerland to bunch federal, cantonal and municipal ballots to reduce the number of voting days per year. On the 27th of September 1998, two other equally debated federal ballots (plus local issues in most cantons) on completely different topics were held.[11] The selection bias from other ballots clearly differs from the one we are interested in. Identical participation rates across all federal cantonal, and municipal ballots in almost all municipalities show that once voters have decided to incur the

[9] Both scenarios are adapted from forecasts of the Swiss Federal Office for Statistics. The offsetting consumption tax rates amount to 0.82% and 0.91% for the optimistic and the pessimistic scenario, respectively. The corresponding numbers for an increase in the payroll tax are 1.03% and 2.22%.

[10] Federal income taxes are a relatively small fraction of individuals' income taxes. Its structure is very progressive, and low and lower middle–income groups are basically exempt from it.

[11] The first was a change in federal law (challenged by a referendum) implying a substantial increase in user fees of heavy trucks ("Bundesgesetz über eine leistungsabhängige Schwerverkehrsabgabe" / "Loi fédérale concernant une redevance sur le trafic des poids lourds liée aux prestations"). A majority of voters favored the change. The second was a popular initiative aiming to adjust the Swiss agricultural subsidy scheme in favor of small ecologically producing farms ("Volksinitiative für preisgünstige Nahrungsmittel und ökologische Bauernhöfe" / "Initiative populaire pour des produits alimentaires bon marché et des exploitations agricoles écologiques"). This popular initiative failed by a large margin.

fixed cost of voting, they participate in all ballots regardless of how much they are affected by each referendum. Consequently, it is not possible to disentangle participation effects of a single vote.

Second, participation patterns in Switzerland are very robust[12] and do not seem to depend much on the debated issue. It is also important to account for institutional differences like fines for non–participation (canton Schaffhausen), the possibility of voting by mail, and different opening hours of polling stations. In simple OLS regressions of the participation rate in the September 1998 federal ballots on several explanatory variables, cantonal effects explain a large share of the variance in participation rates. There is no evidence that the beneficiaries of a lower female retirement age have a higher participation rate. Municipalities with a larger proportion of middle–aged females even have a lower participation rate. Participation rates are higher for communities with an above average fraction of self–employed and right–wing party voters, and lower for those with a higher fraction of blue–collar workers, unemployed and social democrats. All these findings conform well with previously observed regularities of voting behavior.

3.2 Aggregation or the Dominance of Income Variables: A Simulation Experiment

One of the major problems with real data on a municipality level is that the joint distribution of income and age is generally not known even if the marginal distributions are.

To illustrate this point, let us consider two hypothetical economies composed of towns with perfectly rational married couples. The age distribution and average community income of the two artificial countries are identical. In the first economy, inhabitants of towns are very homogenous in terms of income. Even if there is income heterogeneity *between* the municipalities, demographic variables will explain a large fraction of the voting outcome. In the second economy, half of a municipality's couples earn nothing, and the remaining 50% earn twice the economy's average wage. In this latter artificial country, the demographic variables will be almost completely swamped by the income variable, as rich couples oppose and poor couples support the initiative. Although the two economies seem identical for the empirical researcher's eyes, the estimates of vote shares as a function of demographic and income variables will look differently. Some additional information on the income distribution, for example the Gini coefficient, or a suitable estimation strategy may mitigate this problem to some extent.

The question is how much economic insight we can expect to deduce from municipality data when the joint distribution of age and income is not known. To investigate this question with a realistic income distribution, 500 towns with

[12] Although more formal research into this question would be desirable, these regularities are well documented in the local political science literature (see Joye (1990)).

a between and within community income distribution closely matching that of Switzerland are simulated. Each community is inhabited by 200 married couples whose age is randomly chosen from the Swiss empirical age distribution. The corresponding income for each couple is a random variable drawn from a lognormal distribution around the town's average income.[13] The number of couples is chosen to be relatively small to insure a similar degree of heterogeneity in the age structure of municipalities as in the data. In reality, differences in the demographic structure are caused by employment opportunities, schools, and the real estate market among other things, features I have not attempted to include in this analysis.

From these 200 couples average income, the Gini coefficient, and the demographic distribution for the municipality are computed. I thus forget all the remaining information, in particular the joint distribution of age and income. The derived municipality statistics, which correspond to the ones observed in the real data, are used to illustrate the estimation strategy.

The support for the initiative in the simulated economy is 46%, i.e., higher than in reality (39%). However, this finding is not surprising given the fact that we based the simulation on married couples only. The other polar assumption — all agents act as if they were single — would yield a support of approximately 30–35% (depending on the income share of women) as all men, some young women and all elderly female voters oppose the initiative.

3.2.1 Estimation Results in a Simulated Economy

Here I apply the estimation strategy (to be explained in more details in section 4 below) to the simulated data, using only limited marginal distributions as in the real data. The logit of the approving vote share P_i ($= \lambda_i$ for municipality i) is regressed on different combinations of demographic (D_i) and income variables (Y_i), i.e.,

$$\lambda_i \equiv \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + Y_i\beta^Y + D_i\beta^D + \epsilon_i.$$

Six different regressions are run and presented in Table 1: **A1**, **A2**, **A3**, and **A4** contain estimates with simplified demographics and various combinations of demographic and income variables. **A5** and **A6** illustrate the impact of using detailed demographics.

As predicted by our theoretical model, young and middle–aged voters oppose the initiative, while middle–aged couples tend to favor it (**A1**–**A4**). The support is larger in low–income communities and those with a higher income dispersion. Demographic variables alone lead to a poor fit of the model as specification **A1**

[13] More precisely, each couple is given a whole income profile around the chosen life–time average income. A description of the model and the calibration parameters for the simulated economies can be found in the Appendix B.

shows. Once the income distribution is accounted for, however, the explanatory power of the model depends little on the exact specification of the model.

One possibility to deal with the missing joint distribution of income and age is to use interaction terms, age $\times$ income (**A3, A4**). Note the reversal of the signs for the interactions terms depending on whether income is included as an additional explanatory variable in the estimates.[14] The use and interpretation of interaction terms to pick up the joint distribution is therefore not innocuous.

Exploratory estimates with real data (of which the age–distribution is available in 5–year age groups) revealed that a detailed demographic structure might be too fine a partition, especially as multicollinearity problems between, and large dispersions within age–groups are prevalent. This preliminary finding is clearly replicated in the simulated economy (**A5**). Some more structure can be gained if demographic variables are orthogonalized (**A6**, details in section 4). However, there are hardly any additional insights compared to a setting with simplified demographics.

The most important lesson to be taken from this exercise is that even if all agents behaved completely rationally according to the presented life–cycle model, the demographic structure as an explanatory variable for voting behavior is largely dominated by income effects. Due to the dominance of income, detailed demographics might not be too informative, especially if the data had not been orthogonalized. Nonetheless, the predicted pattern from theory remains clear when a smaller set of demographic variables is used. It seems better to restrict the analysis to those age–groups whose utility differences between the two options can be expected to be reasonably large.

[14] To correct for a possible non–linear of income on the voting result, I also estimated specification **A4** with different polynomials in income without a substantial change in the outcome, however.

Variable	**A1** *simplified*			**A2** *simplified*			**A3** *simplified*			**A4** *simplified*			**A5** *untransformed*			**A6** *transformed*		
Log(Income)				-2.19	(.075)	**				-3.72	(.436)	**	-2.20	(.070)	**	-2.20	(.070)	**
Gini				.847	(.287)	**				.794	(.290)	**	.877	(.268)	**	.877	(.268)	**
young (20–29)	-1.01	(.999)		-1.29	(.318)	**	-1.47	(.383)	**	-1.17	(.317)	**						
middle (50–59)	1.43	(.981)		1.44	(.312)	**	1.36	(.377)	**	1.58	(.313)	**						
old (65 +)	-2.04	(1.22)		-2.40	(.388)	**	-3.18	(.472)	**	-2.19	(.391)	**						
young × income							-4.52	(1.01)	**	1.90	(1.11)							
middle × income							-2.08	(.982)	*	3.06	(1.03)	**						
old × income							-5.44	(1.01)	**	3.53	(1.28)	**						
20–24													-2.10	(1.02)	*	-1.30	(.403)	**
25–29													-1.72	(1.03)		-.818	(.376)	*
30–34													-.150	(1.02)		.990	(.312)	**
35–39													-.682	(1.04)		.624	(.317)	*
40–44													-1.91	(1.06)		-1.22	(.359)	**
45–49													-.372	(1.08)		.497	(.404)	
50–54													1.84	(1.06)		4.23	(.430)	**
55–59													-.906	(1.02)		1.67	(.473)	**
60–64													-1.74	(1.14)		1.59	(.626)	*
65–69													-2.05	(1.17)		1.83	(.732)	*
70–74													-4.99	(1.19)	**	-2.40	(.934)	**
75–80													-4.46	(1.27)	**	-4.46	(1.27)	**
Observations	500			500			500			500			500			500		
Adj. R^2	.0080			.8995			.8753			.9017			.9127			.9127		

Table 1: *Estimated parameters (grouped logit estimation) of a simulated economy composed of 500 municipalities. Standard errors are in parenthesis; * and ** denote statistical significance at the 5% and 1% significance level, respectively. Summary statistics (mean/standard deviation): Income (50139/20762), Gini (0.360/0.087), young (0.166/0.031), middle (0.168/0.031), old (0.200/0.025), approving vote share (0.459/0.162).*

4 Empirical Strategy and Data

4.1 Estimation method

A voting result in a municipality is a grouping of binary responses ("YES" and "NO"). What we observe is the proportion P_i of n_i people (i.e., the number of voters participating in the vote) in municipality i chosing "YES". The approving vote share is then assumed to depend on a vector of explanatory variables X_i. The logistic model offers an easy procedure to deal with grouped data. The approving vote share P_i is modeled as

$$P_i = \frac{\exp(\alpha + X_i\beta)}{1 + \exp(\alpha + X_i\beta)}. \tag{1}$$

The logit of P_i , λ_i , is then a linear function,

$$\lambda_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \alpha + X_i\beta.$$

Weighted least squares regression produces the minimum chi–squared estimates of β. As the weights are functions of the unknown parameters, a two-step procedure must be applied. Ordinary least squares in a first step produces consistent, but inefficient estimates. In the second step, the weights $w_i = (n_i\lambda_i(1 - \lambda_i))^{1/2}$ can be used for weighted least squares.[15]

Applying standard analysis of grouped data is not without problems. Ideally, individuals should be grouped according to some common characteristics, an assumption which is clearly not satisfied for individuals living in different communities. Fortunately qualitative results are relatively robust across estimation methods, but care should be taken when interpreting standard errors or significance levels.

Following the predictions of our theoretical model, the logit λ_{ik} of the initiative's approval rate in municipality i, canton k, is a function of the demographic composition, income distribution and possibly some other socio–economic characteristics of a municipality. The base specification is

$$\lambda_{ik} = \alpha + D_i\beta^D + Y_i\beta^Y + S_i\beta^S + P_i\beta^P + C_i\beta^C + V_i\beta^V + K\beta^K + \epsilon_{ik}, \tag{2}$$

where D_i is a vector of demographic variables, such as the fraction of voters in given age $\times$ gender $\times$ marital status groups. Y_i captures the income distribution of a municipality, and the vector S_i describes its socio–economic composition. The latter includes different employment patterns to capture potential differences in the disutility of labor and risk aversion, as well as the number of children as a proxy for altruism. The vector P_i is a vector of political parties' vote shares to

[15] See Amemiya (1981) and Greene (1993) for detailed descriptions of the analysis of grouped data, and some further discussion.

capture ideological differences. The vector C_i contains other control variables that should not influence the voting decision from an economic point of view, but have proven to be important determinants of voting decisions in the past. These include notably language and religion. V_i is the participation rate. K is a vector of canton dummies to capture differences in the fiscal structure, degree of direct democracy, and other important structural differences between the Swiss cantons. The error term ϵ_{ik} is assumed to be normally distributed with mean 0 and variance σ_k. The vectors β^X are parameters.

A major difficulty in the analysis is the high degree of multi–collinearity in the explanatory variables; demographics, in particular, is everywhere. A high average income for a municipality, for example, may be the sign of a strong economic performance, but might as well be due to a large group of middle–aged inhabitants at the peak of their income profile. Even the strength of political parties has a strong demographic component. To disentangle the effects of demographic, income and other control variables, the latter two groups are regressed on the whole demographic distribution of the municipality with a linear probability model, i.e.,

$$Z_i = \gamma_0 + D_i\gamma^N + \epsilon_i^Z, \tag{3}$$

where $Z_i \in \{Y_i, S_i, P_i, C_i\}$. The residuals $\hat{\hat{Z}}_i$ from this regression are then used instead of Z_i as explanatory variables in the specification (2).

The next problem to tackle is the choice of demographic variables. It is obvious that, for example, the fraction of males and females falling into a certain age group are highly correlated, especially for married voters. And in municipalities with a large fraction of middle–aged and elderly agents, the fraction of young people has to be low. Two approaches are used in the present analysis: The first is using a relatively detailed set of demographic variables and orthogonalize the data. Starting with the fraction of males of age 18–22, only the orthogonal information of subsequent groups is used, i.e., the information not explained by groups previously included in the set of explanatory variables. These transformed demographic variables are denoted by $\widehat{D}_i$. The second approach is to limit the analysis to a relatively small group of demographic variables, which are sufficiently independent from each other. These are then denoted by $\widetilde{D}_i$.

As a main specifications for the analysis, I use a smaller set of demographic variables, with and without canton fixed effects, i.e.,

$$\lambda_{ik} = \alpha + \widetilde{D}_i\beta^D + \hat{Y}_i\beta^Y + \hat{S}_i\beta^S + \hat{P}_i\beta^P + \hat{C}_i\beta^C + \hat{V}_i\beta^V + K\beta^K + \epsilon_{ik}. \tag{4}$$

$$\lambda_{ik} = \alpha + \widetilde{D}_i\beta^D + \hat{Y}_i\beta^Y + \hat{S}_i\beta^S + \hat{P}_i\beta^P + \hat{C}_i\beta^C + \hat{V}_i\beta^V + \epsilon_{ik}. \tag{5}$$

However, to illustrate the relevance and impact of the proposed transformations, three combinations of transformations are also presented, together with specification (2):

$$\lambda_{ik} = \alpha + \widehat{D}_i\beta^D + Y_i\beta^Y + S_i\beta^S + P_i\beta^P + C_i\beta^C + \hat{V}_i\beta^V + K\beta^K + \epsilon_{ik}, \tag{6}$$

$$\lambda_{ik} = \alpha + \widehat{D}_i\beta^D + \hat{Y}_i\beta^Y + \hat{S}_i\beta^S + \hat{P}_i\beta^P + \hat{C}_i\beta^C + \hat{V}_i\beta^V + K\beta^K + \epsilon_{ik}. \tag{7}$$

4.2 Data

The data for the estimates are taken from the 1990 Swiss census, with the exception of income data and political parties. A detailed description of the variables, including summary statistics (Figure 5) and a correlation matrix (Figure 6) can be found in Appendix A. Note that the mean for all variables is also given for subsets of municipalities with a 80% German, French, or Italian speaking majority. Already a casual inspection of these summary statistics shows that there are no large differences at least between the German and the French part.

As the census took place eight years before the ballot, the data set has some limitations, especially for demographic variables. It is, however, not possible to use other sources because of data availability. The composition of municipalities used in the analysis is entirely based on *Swiss citizens* (foreigners do not have the right to vote), with the exception of income. The relatively high fraction of foreign residents in Switzerland, ranging from 0 to almost 50%, proves to be a big advantage as it reduces the multi–collinearity of demographic variables to some extent.

While socio–economic variables can be expected to be reasonably stable over a period of eight years (they have been in the ten years before the 1990 census), demographic composition, especially marital status, is bound to change. The demographic composition in 1990 can only be taken as a proxy for the demographics in 1998.[16] Therefore, I use information about marital status only for agents age 40 and older at the time of the census. As argued in the theory section, divorced agents should rationally make similar choices as married people. Because according to population statistics, a majority of divorcees in the relevant age groups were still married in 1998, this group is not directly included in the analysis. Female voters are pooled as a preliminary analysis reveals little difference between single and married women.

The federal tax authority reports the number of tax–payers, total net taxable income, and tax revenues per municipality. The most recent available data is from 1993/94. Average income is proxied by net taxable income per tax–payer. As the distribution is schewed, the log of average income is used. The federal tax scheme being progressive, some information about the income distribution can be derived. I construct the Gini coefficient of a hypothetical bipolar income distribution consistent with observed per capita net taxable income and tax revenues (details to be found in Appendix A).

Political preferences are proxied by the vote shares of the three most important political parties in the 1999 elections. The three parties account for roughly

[16] It is possible to forecast the 1998 demographic composition by means of mortality, birth, and migration rates. As the relevant information is not available on the municipality level, one has to use national or cantonal data. It is therefore not surprising that estimates on these transformed data hardly differ from the estimates of the untransformed data. The results presented are for *untransformed* variables.

60% of the votes. There are considerable (historical) differences between the regional sections of political parties. The three chosen parties are among the more homogeneous ones, however.

5 Estimation Results

Tables 2, 3 and 4 report the estimates for several specifications. The former two use simplified demographics, $\widetilde{D}$. Table 2 shows coefficients for specification (4) with canton fixed effects, and for (5) without. The model is also fitted for municipalities with a majority of German, French or Italian speakers separately in Table 3. Table 4 uses the full demographic distribution and shows three different transformations of the explanatory variables. Despite potential specification problems, most results are remarkably robust.

5.1 Income and Socio–Economic Characteristics

The most striking result of the analysis is the huge importance of language composition on the voting outcome. A 10% increase in French speakers, for example, increases the support for the initiative by almost two percentage points. The result is robust even if canton fixed effects take out most of the canton specific characteristics. These findings will be discussed in more details below. *Catholic* voters seem to support the initiative more than non–Catholics (mainly protestants). One explanation of this result could be that catholic people are more concentrated in rural areas.[17]

Not surprisingly, higher *taxable income* reduces the support for a low female retirement age considerably. The coefficient of income is substantially lower than for the simulated economy despite equal average income. This is mainly due to the fact that income effects in the real data are also picked up by other variables, such as the fraction of self–employed, and the strength of right–wing parties. Moreover, the shape of the income profile underlying the simulated economy represents an average. If other income groups have a different profile (presumably steeper for the rich), the relationship between current income and a rational voting decision is changed. Such detailed information on income profiles is not available, unfortunately.

Unlike in the simulated economy, the *Gini coefficient* has a negative sign in most regressions. It seems as if in municipalities with more income inequality, fewer people benefit from a low female retirement age. One possible explanation is that more people with low taxable incomes in these communities live on capital

[17] I did not include a variable for rural and urban areas, as the available data is very unsatisfactory. It is basically based on community size: Some municipalities within a 5 miles radius of a major city center are often indicated as rural. Canton fixed effects may pick up some part of this information.

income, which is taxed very lightly in Switzerland. An increase in the consumption tax rate might harm them more than a postponed claim to a relatively low retirement benefit. An alternative reason for this finding might be that the tax data is collected for the whole population, while voters are of Swiss nationality. Municipalities with a large foreign population might display a relatively high income dispersion and a low average taxable income, but a much higher average income for Swiss citizens.[18] In both cases, a high Gini coefficient may point to the fact that income has been underestimated.

Communities with a high fraction of *self–employed* oppose the initiative significantly more. The reverse is true for those with a high fraction of *blue–collar worker*. These findings are not surprising either, self–employed agents have presumably a lower degree of risk aversion, a lower disutility of labor, and, as Alesina & La Ferrara (2000) have found for the US, a higher aversion to redistribution. The negative coefficient of *unemployed* people in most regressions should be interpreted with care. Unlike other explanatory variables, the unemployment rate has changed considerably between 1990 and 1998, from under one percent to almost 5 percent. Nonetheless, regions with an above average unemployment in 1990 were also the ones with an larger rate eight years later. One interpretation of the negative sign would be that unemployed people (and those more prone to be unemployed) would prefer a shift in government transfers from the pension system to a more generous unemployment insurance.

The number of *children*, which can be interpreted as a proxy for altruistic attitudes, has a strongly significant negative coefficient. Due to a very low implicit rate of return of the PAYG system, children should rationally choose a higher female retirement age, had they been allowed to participate in the vote. Although they had not, their interests were apparently well represented.

The fraction of *housewives*, taken as a proxy for family structure, has a positive sign and is significant in some of the estimates. Due to child–care credits and contribution splitting, housewives can claim benefits when they reach the statutory retirement age. Everything else equal, more traditional municipalities with a larger fraction of stay–home wives should therefore not necessarily vote differently from more modern communities. The sign for housewives in the French speaking communities is negative. This could mean that women stay home in more affluent households, or that the fraction of housewives is closely related to the effect of more children as mentioned above.

Participation has a negative sign, but is only significant in a regression of German speaking regions. The negative sign could be the result of participation picking up some variation in demographics. Men in general, and middle–aged men in particular usually have an increased participation regardless of the type of the ballot. Due to higher mortality rates, men are somewhat underrepresented in the

[18] The foreign population is overrepresented in both the lowest and the highest income brackets.

simplified demographic variables. The participation rate may have corrected this effect.

5.2 Gender and Age Differences

Theoretical model predicts that municipalities with a large fraction of young agents of both sexes are more likely to oppose the initiative, i.e., to support a higher female retirement age. While this is clearly true for young men, the evidence is mixed for young women. There is some evidence that very young women (age 18–22) support a higher female retirement age (**D2, D3** in Table 4), as well as young women (age 18–27) in the German speaking part (**L1** in Table 3). The former two groups are in fact the only female voters to support postponing retirement. Even women beyond the proposed higher age oppose the increase, though this finding is not completely robust to specification, as Table 4 shows. A possible explanation for this finding is that elderly females take an increase in female retirement age as a signal for future pension cuts which might affect them later. Alternatively, unlike most men who are cared for by their wives in old age, old females rely more heavily on their children for social contacts. They may want, therefore, their daughters(–in–law) to be able to retire earlier.

The remarkable support of a higher female retirement age by (married) men is an indication that voters act as individuals to some extent, and not primarily as household members with negatively affected spouses. The opposition against the initiative may still contain an income element despite the transformations, as married men tend to have higher income than both women and single men. Estimation **B3** with interaction terms, however, casts some doubt on this hypothesis. More importantly, men are covered to a much larger extent by employer pension plans (which also offer generous insurance for surviving spouses). Nonetheless, married women should take this into account as well and act accordingly, if their preferences were similar. An obvious explanation for the discrepancy would be a gender difference in the preference for redistribution, as had been nicely documented in Boeri et al. (2001) and Alesina & La Ferrara (2000).

5.3 Ideology Matters!

After the ballot the media reported the results as strong evidence for ideological decision making. Although this claim seems exaggerated given the empirical evidence, political preferences have played a substantial role. This finding is clearly at variance with the questionnaire study of in Boeri et al. (2001) which finds that political preferences are virtually unimportant. One possible explanation for the discrepancy might be that voters and interviewees may not only care about the contents of a reform, but also about who proposed the reform. In that case, some of the importance of political parties in the analyzed referendum might come from the fact that the initiative originated in left–wing groups.

Municipalities with a larger share of social–democrat voters strongly support the initiative, while those with a higher fraction of right–liberal voters strongly oppose it, everything else equal. A larger share of christian–democrat voters is associated with a stronger support in German speaking regions and with a lower support in French and Italian speaking regions. In the latter two, the christian–democrats are relatively more right–wing than in the German speaking part.

5.4 Do French and Italian Speakers decide Differently?

That language composition plays a large role is undisputed. Two interesting questions arise from this finding. First, does language capture some other features of the different regions that has mistakenly been ignored in the specification? And second, do regions also display different voting behavior along other dimensions, i.e., do separate estimates for language regions differ?

The first question can probably be answered in the negative. It is hard to think of any economic characteristics not included in the analysis apart from one important difference that is unfortunately not reflected in the data: Recent economic downturns tended to be more severe in Latin regions than in the German speaking part.[19] One shortcoming of the data is the outdated information of unemployment. But as argued before, unemployment in 1998 was correlated with unemployment in 1990. Indeed, communities with a high unemployment rate were predominantly located in the Latin parts even in 1990. Differences between the German and French part are minor in terms of income, socio–economic preferences, strength of political parties, and demographics. The Italian part is different, but so is its voting behavior. A much smaller fraction of the municipality variation can be explained there.

The French and German part display a similar voting pattern. Political preferences are somewhat more important in the French part, while the fraction of children is unimportant in the latter (it could have been picked up by the fraction of housewives). Young women in the German speaking part seem to prefer a higher female retirement age, while their counterparts in the French part are indifferent. With voting patterns so similar for the two language regions, what does explain the difference in outcome? Again, as with gender difference, there might be a potentially higher support for redistribution (higher risk–aversion?) in certain regions. The French part and its press, moreover, closely monitor the social and economic developments in neighboring France where working hours and contribution years are much shorter. While the same is true for Germany, the affinity between the German speaking part and Germany is much lower. Because the German speaking part is also largest and economically most powerful part, it is much more self content than minority regions.

[19] The depths of recessions might also be an endogenous phenomenon to a certain extent, reflecting differences in preferences, in particular a much larger — and better accepted — government in the French speaking part.

6 Conclusions

The empirical analysis of the plebiscite on female retirement age delivers some interesting results. In general, the impact of income and age are as expected from theory. While gender differences for young agents are relatively small, middle–aged and elderly female voters oppose pension cuts much more than men, even when they are not directly affected anymore. Richer municipalities and those with a large share of self–employed, children, or right–wing voters are more likely to favor an increase in female retirement age. Our estimations of the referendum also show the importance of socio–economic variables which are not typically considered by economic analysis. In particular, language turns out to be highly significant in all cases, even after controlling for measures of economic performance and demographics.

It is obvious that the result from a referendum on a *general* increase in retirement age would look differently from a referendum on an increase in *female* retirement age. The strong support of a higher female retirement age by married men might be a signal that some (male) voters might be against an increase in contribution rates, at the expense of postponing legal retirement age. In addition, in some countries, middle– and high–income earners are relatively well covered by fully funded pension plans and private savings, which makes them less vulnerable to cuts in the PAYG system.

Given the unfavorable demographics in almost all industrialized countries, the number of retired voters will grow considerably over the next few decades. The voting behavior of the elderly will thus be a crucial factor in future pension reforms. In theory, these voters should be better off with lower taxes and a later retirement. However, if they take any proposed increase in retirement age as a signal for future cuts, as elderly women might have done in 1998, they might oppose the reform after all. If the government can credibly commit to strictly grandfathering the pensioners, the political feasibility of increasing retirement age will — unlike other reform options — not diminish in the future.

Changes in retirement age have other attractive features which may give them an advantage over other policy options: First, grandfathering of elderly individuals after the reform is easy, and the transition periods can be kept short. Second, instead of uniformly cutting the benefit level, the elderly get a sufficient pension when they are least capable of supplementing their income. Third, retirement age can be linked to life–expectancy in a straight–forward way. One draw back of such a policy is that mortality differences across income–groups may favor the rich. But this problem could be circumvented by making retirement conditional on the number of working years and not on age, or by subsidizing early retirement of low–income workers with a long working history.

Variable	B1 *all*			B2 *all*			B3 *all*		
Participation	.124	(.071)		-.113	(.076)		-.107	(.076)	
French	.612	(.016)	**	.315	(.025)	**	.316	(.025)	**
Italian	.824	(.034)	**	-.168	(.064)	**	-.166	(.064)	**
Catholic	.081	(.034)	*	.105	(.043)	*	.112	(.043)	**
Taxable Income (log)	-.619	(.036)	**	-.443	(.033)	**	-.477	(.290)	
Gini coefficient	-1.02	(.118)	**	-.702	(.101)	**	-.705	(.101)	**
Unemployed	5.46	(1.51)	**	-2.97	(1.35)	*	-2.88	(1.34)	*
Self–Employed	-3.58	(.291)	**	-2.48	(.254)	**	-2.33	(.257)	**
Housewife	.328	(.383)		.649	(.342)		.802	(.345)	*
Blue–Collar	.813	(.277)	**	1.67	(.241)	**	1.65	(.242)	**
Children age 8–14	-3.78	(.491)	**	-3.59	(.409)	**	-3.54	(.416)	**
Social–democrat	.898	(.055)	**	1.85	(.074)	**	1.83	(.074)	**
Right–liberal	-.090	(.048)		-.236	(.062)	**	-.250	(.063)	**
Christian–democrat	.310	(.058)	**	.524	(.069)	**	.528	(.068)	**
Young male	-3.06	(.477)	**	-2.69	(.389)	**	-2.83	(.393)	**
Young female	1.53	(.509)	**	-.445	(.423)		-.507	(.424)	
Middle male married	-6.67	(.663)	**	-2.74	(.574)	**	-2.69	(.573)	**
Middle male single	3.98	(1.42)	**	-1.39	(1.18)		-1.17	(1.21)	
Middle female	11.38	(.468)	**	3.73	(.474)	**	3.91	(.479)	**
Old male married	-4.66	(.509)	**	-2.86	(.442)	**	-2.91	(.462)	**
Old male single	-3.70	(.849)	**	-4.50	(.695)	**	-5.14	(.744)	**
Old female	4.12	(.243)	**	1.34	(.249)	**	1.53	(.262)	**
MYOUNG × TAXIN							2.82	(1.87)	
FYOUNG × TAXIN							-1.27	(2.29)	
MMMID × TAXIN							5.71	(3.05)	
MSMID × TAXIN							10.85	(6.07)	
FMID × TAXIN							-6.77	(1.98)	**
MMOLD × TAXIN							2.95	(2.04)	
MSOLD × TAXIN							5.34	(3.31)	
FOLD × TAXIN							-1.48	(1.09)	
Canton fixed effect	NO			YES			YES		
Observations	2825			2825			2825		
Adjusted R^2	.7354			.8344			.8359		

Table 2: *Estimated parameters (grouped logit model), simplified demographics, all regions. Standard errors are in parenthesis; * and ** denote statistical significance at the 5% and 1% significance level, respectively.*

Variable	L1 *german* ≥ 0.8			L2 *french* ≥ 0.8			L3 *italian* ≥ 0.8		
Participation	-.264	(.094)	**	.062	(.145)		-.280	(.288)	
Catholic	.134	(.050)	**	.419	(.107)	**	.349	(.282)	
Taxable Income (log)	-.473	(.044)	**	-.602	(.052)	**	-.687	(.181)	**
Gini coefficient	-.297	(.156)		-.918	(.142)	**	.201	(.457)	
Unemployed	-3.78	(1.97)		1.33	(1.92)		.202	(5.03)	
Self–Employed	-2.67	(.333)	**	-2.61	(.434)	**	-4.29	(1.28)	**
Housewife	.180	(.433)		-1.38	(.593)	*	-1.88	(1.71)	
Blue–Collar	1.28	(.298)	**	1.77	(.419)	**	-.444	(1.22)	
Children age 8–14	-4.12	(.534)	**	.732	(.735)		-.377	(2.10)	
Social–democrat	1.79	(.095)	**	.752	(.150)	**	-.276	(.433)	
Right–liberal	-.102	(.085)		-.600	(.110)	**	-.934	(.331)	**
Christian–democrat	.282	(.094)	**	-.572	(.143)	**	-.522	(.313)	
Young male	-3.11	(.497)	**	-2.00	(.657)	**	1.20	(1.99)	
Young female	-2.21	(.545)	**	.223	(.698)		-2.43	(2.59)	
Middle male married	-.235	(.745)		-4.28	(1.00)	**	-.113	(3.62)	
Middle male single	1.31	(1.53)		-4.14	(2.02)	*	.210	(1.93)	
Middle female	3.88	(.548)	**	2.19	(.720)	**	-6.55	(1.96)	**
Old male married	-4.14	(.539)	**	-3.93	(.780)	**	-2.32	(2.51)	
Old male single	-5.78	(.918)	**	-3.94	(1.25)	**	.454	(.845)	
Old female	2.43	(.258)	**	1.21	(.353)	**	2.36	(.251)	**
Canton fixed effect	YES			YES			YES		
Observations	1558			852			203		
Adjusted R^2	.7732			.7180			.3617		

Table 3: *Estimated parameters (grouped logit model), simplified demographics, language regions. Standard errors are in parenthesis; * and ** denote statistical significance at the 5% and 1% significance level, respectively.*

transformed Variable	D1 no/no = (2)			D2 yes/no = (6)			D3 yes/yes = (7)		
Participation	-.138	(.075)		-.138	(.075)		-.138	(.075)	
French	.313	(.026)	**	.313	(.026)	**	.313	(.026)	**
Italian	.166	(.079)	*	.166	(.079)	*	.166	(.079)	*
Catholic	.118	(.043)	**	.118	(.043)	**	.118	(.043)	**
Taxable Income	-.436	(.032)	**	-.436	(.032)	**	-.436	(.032)	**
Income Distribution	-.594	(.100)	**	-.594	(.100)	**	-.594	(.100)	**
Unemployed	-2.95	(1.33)	*	-2.95	(1.33)	*	-2.95	(1.33)	*
Self–Employed	-2.50	(.255)	**	-2.50	(.255)	**	-2.50	(.255)	**
Housewife	1.11	(.341)	**	1.11	(.341)	**	1.11	(.341)	**
Blue–Collar	1.71	(.239)	**	1.71	(.239)	**	1.71	(.239)	**
Children under 10	-4.81	(.773)	**	-4.81	(.773)	**	-4.81	(.773)	**
Social–democrat	1.77	(.074)	**	1.77	(.074)	**	1.77	(.074)	**
Right–liberal	-.195	(.062)	**	-.195	(.062)	**	-.195	(.062)	**
Christian–democrat	.542	(.069)	**	.542	(.069)	**	.542	(.069)	**
18–22 male	-1.24	(.762)		-3.64	(.809)	**	-5.42	(.629)	**
18–22 female	-.614	(.760)		-1.72	(.807)	**	-2.05	(.633)	**
23–27 male	-4.64	(.915)	**	-1.30	(.666)		-1.25	(.524)	*
23–27 female	-4.60	(.911)	**	.891	(.664)		1.62	(.544)	**
28–32 male	-3.97	(.955)	**	.372	(.652)		-.664	(.570)	
28–32 female	-5.82	(.955)	**	1.55	(.646)	*	1.93	(.577)	**
33–37 male	-2.85	(1.00)	**	-2.68	(1.00)	**	-3.94	(.822)	**
33–37 female	-2.77	(1.02)	**	-1.50	(1.03)		-1.07	(.717)	
38–42 male	-3.13	(1.06)	**	.111	(.814)		-.575	(.660)	
38–42 female	-1.31	(1.11)		1.70	(.988)		.986	(.641)	
43–47 male	-2.92	(1.05)	**	-1.24	(.877)		-.627	(.682)	
43–47 female	.561	(1.14)		5.50	(.872)	**	4.92	(.653)	**
48–52 male single	-4.03	(1.86)	*	2.01	(1.75)		.757	(1.69)	
48–52 male married	-5.25	(1.12)	**	-4.76	(.982)	**	-3.38	(.802)	**
48–52 female	.172	(1.13)		4.81	(.791)	**	4.37	(.662)	**
53–57 male single	-8.44	(2.33)	**	-2.47	(2.16)		-1.80	(2.10)	
53–57 male married	-3.57	(1.13)	**	-3.27	(.994)	**	-3.27	(.994)	**
53–57 female	-.295	(1.16)		2.64	(.832)	**	2.42	(.727)	**
58–62 male single	-5.62	(2.50)	*	-1.18	(2.43)		-2.27	(2.32)	
58–62 male married	-1.58	(1.23)		-1.02	(1.09)		.247	(.917)	
58–62 female	-3.56	(1.19)	**	2.52	(.944)	**	1.48	(.811)	
63–67 male single	-7.04	(2.48)	**	.218	(2.37)		-.721	(2.28)	
63–67 male married	-3.36	(1.25)	**	-3.78	(1.13)	**	-1.46	(.937)	
63–67 female	-3.14	(1.19)	**	3.86	(.939)	**	2.85	(.838)	**
68–72 male single	-7.25	(2.48)	**	-5.42	(2.41)	*	-4.74	(2.41)	*
68–72 male married	-4.82	(1.25)	**	-4.62	(1.17)	**	-2.87	(1.01)	**
68–72 female	-2.88	(1.16)	*	4.89	(.950)	**	4.36	(.869)	**
73–77 male single	-3.74	(2.56)		1.95	(2.49)		2.23	(2.38)	
73–77 male married	-4.31	(1.28)	**	-2.85	(1.18)	*	-1.45	(1.05)	
73–77 female	-2.50	(1.13)		2.82	(.904)	**	2.22	(.888)	**
78+ male single	-4.83	(1.55)	**	-3.19	(1.37)	*	-1.70	(1.35)	
78+ male married	-5.07	(1.05)	**	-4.71	(.863)	**	-4.37	(.882)	**
78+ female	-3.88	(.872)	**	1.42	(.474)	**	1.42	(.474)	**
Canton fixed effect	YES			YES			YES		
Adj. R^2 (Obs.)	0.8412 (2825)			0.8412 (2825)			0.8412 (2825)		

Table 4: *Estimated parameters (grouped logit model) with full demographic distribution. Transformations are as explained in text. Standard errors are in parenthesis; * and ** denote statistical significance at the 5% and 1% significance level, respectively.*

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A Date description

All data are from the Swiss Federal Office of Statistics (Schweizerisches Bundesamt für Statistik). Summary statistics (unweighted) and a correlation matrix can be found in Tables 5 and 6, respectively. The variables are defined as follows (sources in parenthesis):

YES = approving vote share initiative: YES–votes divided by valid votes.

PART = participation rate: Number of votes divided by registered voters (= all Swiss citizens age 18 and older).

GER = German speaking: fraction of Swiss citizens with German mother tongue (census 1990).

FRA / ITA: same as GER for French and Italian.

KATH = Roman catholic: fraction of Swiss citizens belonging to the Roman catholic church (census 1990).

TAXIN = taxable income: Taxable income per tax–payer in 1'000 Sfr. (federal tax office period 1993/1994).

TAXREV = tax revenues: Federal tax revenues per tax–payer.

GINI = Gini coefficient: Gini coefficient constructed from TAXREV, TAXIN, and the federal income tax schedule of 1993/1994. Assumption: a fraction λ of a municipality earns a low income $\max(\text{TAXREV} - a, 0)$, $(1-\lambda)$ a high income $\text{TAXREV}+\frac{\lambda}{1-\lambda}a$. The parameter a is chosen to yield a per capita tax revenue TAXIN in 1993/94. The Gini coefficient is then given as $\text{GINI} = \frac{\lambda \min(a,\text{TAXREV})}{\text{TAXREV}}$. The results are fairly robust to the choice of λ. For the simulations $\lambda = 2/3$ was chosen.

UNEMP = unemployment rate: number of unemployed Swiss citizens divided by all 15–65 year old Swiss citizens (census 1990). More standard definitions of unemployment do not change the results.

SELF = Self–employed: fraction of self–employed among all 15–65 year old Swiss citizens (census 1990).

HOUSE = Housewife/man: dito.

WORK = Blue–collar worker: qualified and unqualified worker, same definition and source as SELF.

CHILD = Children age 8–15: measured by fraction of children age 0–7 in the 1990 census.

SPS = social–democrats: measured as the vote share of the Swiss Social Democratic party at the 1999 election of the Swiss parliament.

FDP = right–liberals: dito, for Liberal Democratic Party.

CVP = christian–democrats: dito, for the Christian Democratic Party, which is approximately at the center of the political spectrum between SPS and FDP.

Demographic variables: measured as a fraction of total voting population (i.e., age 18 and above in 1998, corresponding to age 10 and above in 1990). 5–year age groups under 40 (48 in 1998) are broken into age × gender, those above 48 into age × gender *times* marital status. As the marital status of women turned out to be relatively unimportant, single and married females were pooled. As mentioned in the main text, all estimation results are reported without any adjustments. Simplified demographics uses the following age groups:

- *Young:* age 18–27 at the time of the vote, 10–19 in the 1990 census.
- *Middle–aged:* age 53–62 at the time of the vote, 45–54 in the 1990 census.
- *Old:* age 68+ at the time of the vote, 60+ in the 1990 census.

B The Theoretical Model

The macroeconomic environment is kept simple. A small open economy is analyzed, in which factor prices, wage rate $w(\cdot)$ and real interest rate $r(\cdot)$, are exogenous. There is no wedge between borrowing and lending rates, and agents can lend and borrow freely at the relevant interest rate until they reach the official retirement age. Retirement is assumed to be induced by the age–wage profile and is therefore voluntary.

Agents live a maximum of $J^{\max}$ periods and are indexed by their age j and gender γ. In every period, individuals face a certain mortality risk $1-\psi_{j,\gamma}$, where $\psi_{j,\gamma}$ denotes the probability of being alive in period j, conditional on having been alive in period $j-1$. The unconditional probability of surviving until period j can then be calculated as $\Psi_{j,\gamma} = \prod_{i=1}^{j} \psi_{i,\gamma}$. Note that — as discussed in the main part of the paper — this agent represents an "average" (per generation) across income groups.

B.1 The government and the public pension system

The government provides a pay–as–you–go (PAYG) public pension system, in which the current young have to finance the pensions of the current old. Pension benefits B are paid out after the legal retirement age J^*, regardless of whether the agent leaves the workforce or not. We also assume that future benefits depend on contribution years y (including child–care credits), but not on the amount of payroll taxes paid during working years (with a maximum of $y^{\max}$ working years):

$$B_j = \begin{cases} 0, & j < J^* \\ B\frac{\min(y,y^{\max})}{y^{\max}}, & j \geq J^* \end{cases} \tag{8}$$

The public pension system part is financed by a proportional payroll tax τ and a proportional consumption tax ν on all consumption expenditures.[20] The pension system's intertemporal budget constraint can therefore be written as (gender index dropped for expositional convenience in what follows)

$$\begin{aligned}&\sum_{t=t_0}^{\infty} \frac{1}{(1+r)^{t-t_0}} \sum_{j=1}^{J^{\max}} \mu_j(t) B_j(t) \\ &= D(t_0) + \sum_{t=t_0}^{\infty} \frac{1}{(1+r)^{t-t_0}} \sum_{j=1}^{J^{\max}} \mu_j(t) \Big\{ \tau(t)\omega_j(t) + \nu(t) c_j(t) \Big\} \end{aligned} \tag{9}$$

where $\omega_j(t)$ and $c_j(t)$ denote labor income and consumption expenditures, respectively, of an age–j–individual at time t, and $D(t_0)$ is the pension system's initial wealth.

B.2 Individual decision making

Preferences are time separable and the instantaneous utility function $U[\cdot]$ depends on consumption c and leisure $0 \leq l \leq 1$. Let $\mathcal{S} = \{J^{\text{fem}}, \nu, \tau\}$ be the set of reform policies, and let variables marked with superscript $s \in \mathcal{S}$ depend on the chosen policy. An agent at age with assets $A_{\{J_V-1\}}$ from the previous period maximizes her remaining lifetime utility,

$$\mathcal{U}^s(J_V, A_{\{J_V-1\}}) = \max_{c,l} \left(\sum_{j=J_V}^{J_{\max}} \beta^{j-1} \Psi_j U[(1-\nu^s)c_j, l_j] \Big| A_{\{J_V-1\}} \right). \tag{10}$$

Income opportunities are non–stochastic and known. Let $e_{j,\gamma}$ denote age–j labor productivity, and w the constant real wage rate per efficiency unit of labor. The budget constraints of an individual can then be written as

$$\begin{aligned} (a_0 &= 0) \\ a_{J_V-1} &= A_{\{J_V-1\}} \\ a_j &= (1+r)a_{j-1} + (1-l_j)\, e_j w\, (1-\tau^s) + B_j^s - c_j \\ a_{J_{\max}} &\geq 0 \end{aligned} \tag{11}$$

where a_j are the end–of–period asset holdings of an age–j–individual.

B.3 Welfare comparisons and voting

Welfare differences between two reforms are quantified by a consumption equivalent variation measure. By how much does one have to increase/reduce an individual's consumption (keeping leisure constant) in all future periods for reform s_1 to equalize reform s_2 utility level? The fraction ζ is computed for which

$$\mathcal{U}^{s_2}\left[\mathbf{c}^{s_2}, \mathbf{l}^{s_2} \Big| A_{\{J_V-1\}}\right] = \mathcal{U}^{s_1}\left[(1-\zeta)\mathbf{c}^{s_1}, \mathbf{l}^{s_1} \Big| A_{\{J_V-1\}}\right],$$

[20] In Switzerland, a fraction 0.2 of aggregate pension benefits is financed by general government revenues. In order to simplify the analysis, we approximate this implicit government subsidy by an adjustment in the payroll tax rate.

where $\mathbf{c}^{s_1,s_2}$ and $\mathbf{l}^{s_1,s_2}$ denote optimal consumption and leisure paths, respectively, for an age–J_V agent after reforms s_1 and s_2 . The measure ζ depends on an individual's age and asset holdings. If instantaneous utility is specialized to the constant–intertemporal–elasticity–of–substitution (CIES) case, the percentage in consumption equivalent variation ζ can easily be computed as $\zeta = 1 - \left(\frac{\mathcal{U}^{s_2}}{\mathcal{U}^{s_1}}\right)^{\frac{1}{\theta(1-\sigma)}}$. It is assumed that all reforms are final. The rational individual votes for the option granting her a higher remaining life–time utility as measured by ζ.

B.4 Simulation and Calibration

B.4.1 Benchmark Model

Population forecasts until the year 2040, including mortality rates, were taken from *(SBfS)*. Population forecasts after the year 2040 were obtained by keeping fertility, mortality and immigration rates constant thereafter. The exogenous rates of growth for an optimistic and a pessimistic scenario are 2 and 0 precent, respectively. The real interest rate r used for the simulation was 3%, though the main results are insensitive to the choice of r.

The benefit level is assumed to be linked to the average current wage rate. Calibration of parameters follows standard macro–economic practice (the presented results are not sensitive to parameter choices): The constant intertemporal elasticity of substitution specification $U[c_j, l_j] = \frac{\left(c_j^{\theta} l_j^{1-\theta}\right)^{1-\sigma}}{1-\sigma}$ is used with $\sigma = 4$, and $\theta = 0.33$. The pure discount rate is $\beta = 1.011$ per annum. Average labor earnings profiles e_j are computed from data collected by the *SBfS*.

The individual optimization problem is solved numerically. Fiscal parameters and individual decisions have to be jointly determined. The former are determined by the intertemporally balanced budget rule (9), with the additional requirement the proportionality between benefits and average income remains constant. The baseline case is the NO option, i.e., the higher female retirement age. In the case of YES, the offsetting tax rates are the additional consumption or payroll tax rate necessary to finance the lower female retirement age.

B.4.2 The Artificial Economy

500 communities with 200 married couples are simulated. Each couple is assigned an age, an income profile, and asset holdings consistent with age and income. The age is chosen randomly from the Swiss empirical age distribution in 1995 (per 5–year age group), interpolated to 1998 with a recent population forecast for 2000. The corresponding income profile for each couple is a random variable drawn from a lognormal distribution around the town's average income, which in turn is drawn from a lognormal distribution matching the Swiss between community income distribution. The within town standard deviation is chosen to approximately match the distribution of the Gini coefficient.

Variable	**description**	**year**	**mean**	(G$\geq$ .8 / F$\geq$ .8 / I$\geq$ .8)	**std.**	**min**	**max**
YES	Approving vote share initiative	1998	.411	(.347 / .477 / .539)	.125	.036	.933
PART	Participation rate initiative	1998	.558	(.567 / .587 / .450)	.101	.162	.925
GER	German speaking (census)	1990	.606	(.979 / .059 / .087)	.440	0	1
FRA	French speaking (census)	1990	.283	(.008 / .927 / .016)	.418	0	1
ITA	Italian speaking (census)	1990	.080	(.003 / .004 / .889)	.242	0	1
KATH	Roman catholic (census)	1990	.462	(.393 / .480 / .868)	.334	0	1
TAXIN	Taxable income per tax–payer (1'000 SFr.)	1993/4	50.164	(50.962 / 51.487 / 44.282)	14.920	10.982	271.844
TAXREV	Tax revenues per tax–payer (1'000 SFr.)	1993/4	1.326	(1.302 / 1.461 / 1.082)	1.323	.130	26.577
GINI	Gini coefficient (constructed, $\lambda = 2/3$)	1993/4	.366	(.358 / .359 / .406)	.067	.089	.667
UNEMP	Unemployement rate (census)	1990	.007	(.006 / .009 / .009)	.006	0	.096
SELF	Self–employed (census)	1990	.081	(.076 / .089 / .068)	.038	0	.319
HOUSE	Housewife/man (census)	1990	.107	(.106 / .103 / .132)	.024	0	.235
WORK	Blue–collar worker (census)	1990	.082	(.079 / .090 / .081)	.032	0	.270
CHILD	Children age 8–14 (census)	1990	.099	(.102 / .098 / .078)	.021	.021	.221
SPS	Social–democrat	1999	.191	(.193 / .183 / .183)	.113	0	.944
FDP	Right–liberal	1999	.197	(.178 / .219 / .237)	.129	0	.968
CVP	Christian–democrat	1999	.193	(.163 / .204 / .282)	.203	0	.924
MYOUNG	Young male	1990	.065	(.067 / .066 / .056)	.019	0	.223
FYOUNG	Young female	1990	.060	(.061 / .063 / .056)	.018	0	.232
MMMID	Middle–aged male married	1990	.048	(.058 / .058 / .053)	.014	0	.115
MSMID	Middle–aged male single	1990	.006	(.008 / .008 / .012)	.006	0	.077
FMID	Middle–aged female	1990	.059	(.067 / .072 / .072)	.016	0	.135
MMOLD	Old male married	1990	.068	(.065 / .068 / .072)	.019	.007	.229
MSOLD	Old male single	1990	.010	(.009 / .011 / .016)	.012	0	.188
FOLD	Old female	1990	.114	(.106 / .112 / .157)	.040	.017	.478

Table 5: *Description of variables and summary statistics (untransformed variables). All demographic variables were taken from the 1990 census: Young = age 10–19 (i.e., age 18–27 at the time of the vote), middle–aged = age 45–54 (53–62), and old = age 60+ (68+)at the time of the census. The smallest municipality had 15 voters.*

	PRT	YES	GER	FRA	ITA	KTH	TAX	UNE	SLF	HSE	WRK	CHI	SPS	FDP	CVP	MY	FY	MMM	MSM	FM	MMO	MSO
PART																						
YES	-.265 *																					
GER	.069 *	-.592 *																				
FRA	.207 *	.396 *	-.810 *																			
ITA	-.419 *	.421 *	-.351 *	-.196 *																		
KATH	-.149 *	.373 *	-.242 *	.032	.356 *																	
TAXIN	.027	-.177 *	.037 *	.066 *	-.138 *	-.262 *																
UNEMP	-.212 *	.188 *	-.252 *	.191 *	.132 *	.070 *	.103 *															
SELF	.360 *	-.233 *	-.125 *	.145 *	-.079 *	-.154 *	-.166 *	-.091 *														
HOUSE	-.188 *	.267 *	-.062 *	-.102 *	.287 *	.404 *	-.121 *	.025	-.270 *													
WORK	.090 *	.174 *	-.127 *	.169 *	-.041 *	.379 *	-.415 *	-.074 *	.066 *	-.001 *												
CHILD	.334 *	-.272 *	.196 *	-.031	-.330 *	-.040 *	-.051 *	-.213 *	.206 *	.063 *	-.058 *											
SPS	-.191 *	.195 *	.060 *	-.032	-.042 *	-.215 *	.050 *	.060 *	-.309 *	-.095 *	-.116 *	-.148 *										
FDP	-.019 *	.132 *	-.258 *	.178 *	.203 *	.122 *	.068 *	.104 *	-.010	.013	.004	-.148 *	-.178 *									
CVP	-.044 *	.256 *	-.136 *	-.002	.183 *	.842 *	-.291 *	.029	-.027	.346 *	.341 *	.064 *	-.287 *	-.134 *								
MYOUNG	.247 *	-.139 *	.089 *	.035	-.186 *	.024	.038 *	-.109 *	-.006	.002	.133 *	.326 *	-.145 *	-.034	.051 *							
FYOUNG	.143 *	.014	.005	.085 *	-.106 *	.055 *	.067 *	-.053 *	-.050 *	-.006	.121 *	.228 *	-.096 *	-.021	.066 *	.335 *						
MMMID	.058 *	-.035	.048 *	.055 *	-.114 *	-.168 *	.310 *	-.031	-.179 *	.044 *	-.140 *	.104 *	.050 *	.002	-.187 *	.326 *	.377 *					
MSMID	-.072 *	.042 *	-.071 *	-.026	.155 *	.146 *	-.137 *	.036 *	.155 *	-.033	.148 *	-.134 *	-.066 *	-.019	.136 *	-.120 *	-.110 *	-.146 *				
FMID	-.148 *	.154 *	-.122 *	.123 *	.064 *	-.127 *	.437 *	.152 *	-.270 *	.033	-.205 *	-.282 *	.131 *	.104 *	-.212 *	.144 *	.248 *	.580 *	-.115 *			
MMOLD	.003	.013	-.112 *	.033 *	.080 *	-.131 *	-.154 *	-.006	.211 *	-.148 *	.010	-.346 *	.071 *	.060 *	-.085 *	-.305 *	-.304 *	-.341 *	.024	-.245 *		
MSOLD	.035	.033	-.144 *	.014 *	.156 *	.218 *	-.275 *	-.045 *	.271 *	-.082 *	.131 *	-.120 *	-.176 *	-.011	.263 *	-.148 *	-.142 *	-.305 *	.263 *	-.293 *	.170 *	
FOLD	-.234 *	.177 *	-.200 *	-.031 *	.357 *	.036	-.219 *	.057 *	.016	-.208 *	-.015	-.531 *	.104 *	.106 *	.024	-.377 *	-.328 *	-.384 *	.138 *	-.226 *	.596 *	.378**

Table 6: *Correlation matrix (untransformed variables); * denote significance at the 5% level.*